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(54) **LEVELLING DEVICE, PARTICULARLY FOR FURNITURE**

(57) A levelling device (100) for furniture comprising: a levelling element (1) having a supporting base (2) and a body (3) extending perpendicularly from the base in the direction of a longitudinal axis (X) to determine a height (L) of the body (3); said body (3) being internally hollow and at least partly threaded to form a receiving seat (30); an outer shell (4) intended to be attached to the structure of an item of furniture and forming a housing seat (40) for housing the body (3) with the ability to slide along the longitudinal axis (X); a threaded pin (5) which can be rotatably inserted into the receiving seat (30), said threaded pin (5) being translationally fixed to the shell (4) by means of holding elements (15, 16) in such a way that rotation of the threaded pin (5) in the body (3) causes relative translational movement between the body (3) and the shell (4), characterised in that the body (3) comprises at least one threaded portion (20a) extending over a longitudinal section (L1) of the height (L) of the body (3) which is less than the overall height (L) of the same and is intended to be coupled to an external thread (6a) on the threaded pin (5) and at least one opening (21a) facing said threaded portion (20a), extending over a longitudinal section (L2) which is not less than the longitudinal section (L1) and is defined by the part of the at least one threaded portion (20a) opposite thereto with respect to a longitudinal plane (XY) passing through the longitudinal axis (X) of the body (3).

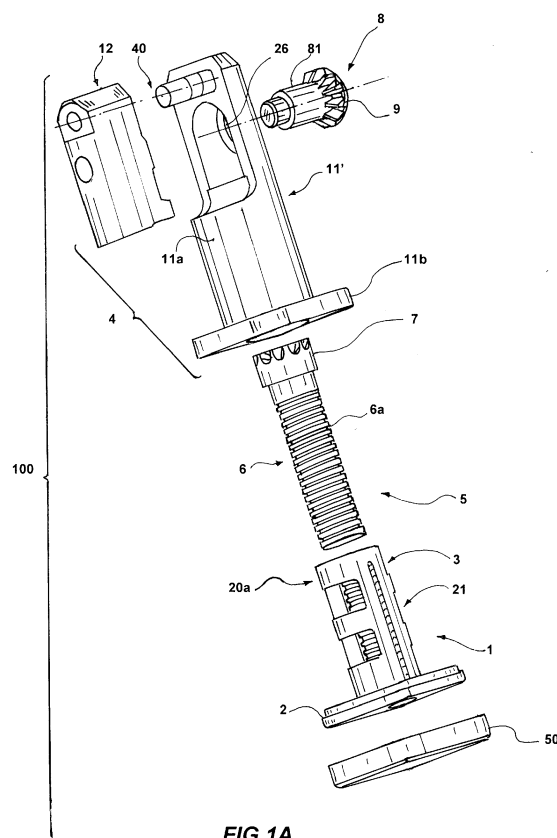


FIG. 1A

Description

Technical field

[0001] The present invention concerns a levelling device to be used particularly for levelling furniture.

[0002] The known levelling devices comprise a first element capable of being stably attached to the item of furniture to be positioned, and a second element intended to rest on the ground and capable of being associated with the first element and movable in translation with respect to the same in order to vary the height of the levelling device, and accordingly the height of the item of furniture to be levelled, with respect to the ground.

[0003] These devices also comprise a screw intended to be received inside the second element and translationally fixed to the first element in such a way that rotation of the screw causes relative translational movement between the first and second elements so as to vary the height of the levelling device.

[0004] The known levelling devices also comprise a pinion intended to be engaged with the head of the screw and capable of being rotated from outside the item of furniture by means of a tool. Rotating the pinion causes a corresponding rotation of the screw in the second element and therefore a relative translational movement between the first and second elements of the levelling device.

[0005] The known devices are formed in such a way as to be housed in a seat formed directly inside the structure of the item of furniture, for example inside a shoulder, and are capable of being actuated from outside the item of furniture by means of suitable tools, such as a screwdriver or a hexagonal key.

[0006] A device of the type described above is shown, for example, in WO 2009/056935.

[0007] A disadvantage of these devices is the fact that the production process includes a tapping phase, in which the threading of the second element is carried out after the element has been moulded.

[0008] This phase entails a considerable loss of time and an increase in the costs associated with the production process for the known levelling devices. Another type of levelling device according to the known art is described in EP 1832201.

[0009] In this device, the second element comprises a first portion internally threaded to allow the coupling between the second element and the threaded screw, and a second supporting portion spaced along the longitudinal translational axis with respect to the first portion and provided with a pair of longitudinal lightening openings.

[0010] This device allows a reduction in the quantity of material used, but the disadvantages pointed out with reference to the device of WO 2009/056935 remain. In addition, the devices produced according to the instructions of EP 1832201 are not very stable and do not allow a solid coupling to be obtained between the screw and the second element of the levelling device.

Description of the invention

[0011] The problem addressed by the present invention is that of producing a levelling device for furniture that overcomes the limits mentioned above with reference to the cited known art.

[0012] In the context of this problem, a first aim of the invention is to provide a levelling device for furniture that is reliable, simple to produce and low in cost.

[0013] A further aim of the invention is to provide a levelling device for furniture whose production steps are simplified and of reduced duration, and which, at the same time, provides a stable coupling between the various parts of the device and therefore offering a precise and durable functioning.

[0014] This problem is resolved and these aims achieved by the present invention by means of a levelling device produced in accordance with the appended claims.

Brief description of the drawings

[0015] The characteristics and advantages of the present invention will better appear in the following detailed description of a preferred embodiment thereof, given for the purposes of non-limitative indication with reference to the attached drawings, in which:

- Figures 1a and 1b are exploded views of a levelling device for furniture according to the invention;
- Figure 2 is a side view of a levelling element of the levelling device of Figure 1;
- Figure 3 is a front view of the levelling element of Figure 2;
- Figure 4 is a perspective view of the levelling element of Figure 2;
- Figure 5 is a perspective view of the levelling element of Figure 2 provided with a threaded pin;
- Figure 6 is a perspective view of the levelling element of Figure 2 provided with a threaded pin and an actuating pinion;
- Figure 7 is an exploded view of an outer shell of the levelling device of

[0016] Figure 1.

Best mode for implementing the invention

[0017] Figures 1a and 1b show a levelling device for furniture 100 produced in accordance with the present invention.

[0018] The device 100 comprises:

- a levelling element 1, shown in greater detail in Figures 2-6;
- an outer shell 4, shown in greater detail in Figure 7, intended to be attached to the structure of an item of furniture to be levelled (the item of furniture is not

shown in the drawings) and arranged to receive the levelling element 1 with possibility to slide along a longitudinal axis X;

- a threaded pin 5, shown in greater detail in Figures 5-6, intended to be interposed in use between the levelling element 1 and the outer shell 4 in order to cause a relative movement between the outer shell 4 and the levelling element 1, as explained in greater detail below; and
- a protection element 50 optionally attachable to the levelling element 1.

[0019] The levelling element 1, which has the general form of an inverted "T", comprises a supporting base 2 for supporting the levelling element 1 on the ground and on the protection element 50 if the latter is used, and a body 3 extending perpendicularly from the supporting base 2 in the direction of a longitudinal axis X of the levelling element 1 to define a height L of the body 3.

[0020] The body 3 is internally hollow and threaded to form a receiving seat 30 for the threaded pin 5.

[0021] The pin 5 comprises a threaded leg 6 with an external thread 6a intended to be rotatably inserted into the receiving seat 30 of the levelling element 1 and a head 7 shaped in such a way as to engage with a pinion 8, as shown in Figure 6, or with a similar actuating element, in such a way that the threaded pin 5 is screwed/un-screwed into/out of the receiving seat 30 by rotation of the pinion 8, as described in greater detail below.

[0022] The pinion 8 is arranged transversally with respect to the threaded pin 5 and comprises a leg 81 and an actuating head 9 intended to be coupled with the head 7 of the threaded pin 5 in order to make it rotate.

[0023] In the version shown, the head 7 is provided with a plurality of ridges 7a extending radially and alternated with a plurality of recesses 7b intended to be engaged with corresponding further recesses 9a and further ridges 9b formed on the actuating head 9 of the pinion 8, in such a way that rotating the pinion 8 in both directions of the arrow F1 in Figure 6 causes a consequent rotation of the threaded pin 5 about the longitudinal axis X, in one of the two directions of the arrow F in Figure 6.

[0024] The head of the pinion 8 is also provided with a seat 10 for the insertion of an actuating tool, such as for example a hexagonal key, to actuate the pinion 8, as described in greater detail below.

[0025] The body 3 comprises at least one threaded portion 20a provided with an internal thread formed by threaded sections shaped in such a way as to mate with the external thread 6a of the leg 6 of the threaded pin 5 in order to couple the levelling element 1 to the threaded pin 5.

[0026] The at least one threaded portion 20a extends along the longitudinal axis X over a longitudinal section L1 of the length L of the body 3, having a lesser extension than the length L.

[0027] The threaded portion 20a extends over an arc of circumference C1 corresponding to an angle which is

less than or equal to 180°; in a preferred version, the threaded portion extends over an arc of circumference C1 corresponding to an angle of 180°.

[0028] On the body 3 is also formed at least one opening 21a facing the threaded portion 20a and extending over a further longitudinal section L2 of the length L of the body 3 along the longitudinal axis X, having a lesser extension with respect to the length L and an extension greater than or equal to the longitudinal section L1.

[0029] The at least one opening 21a faces the at least one threaded portion 20a, opposite thereto with respect to a longitudinal plane XY passing through the longitudinal axis X of the body 3.

[0030] The at least one opening 21a extends over an arc of circumference C2 corresponding to an angle which is greater than or equal to 180°; in a preferred version, the opening 21a threaded portion extends over an arc of circumference corresponding to an angle of 180°.

[0031] The provision of a threaded portion and an opening opposite thereto makes it possible to simplify the production process for the levelling element of the invention.

[0032] Actually, this provision makes it possible to obtain the levelling element equipped with the threaded portion during the moulding phase, thus avoiding the need for a successive tapping phase after moulding.

[0033] The levelling element can be moulded using half-dies shaped in such a way as to obtain the thread of the threaded portion and extract the semi-dies through the opening provided in the body 3.

[0034] The provision of the at least one opening also makes it possible to reduce the consumption of material.

[0035] In the preferred version shown here, the body 3 comprises a plurality of threaded portions 20, each threaded portion 20a of said plurality of threaded portions 20 being spaced apart from each other and not contiguous along the longitudinal axis X and cooperating together to form the receiving seat 30 for the leg 6 of the threaded pin 5.

[0036] Correspondingly, the body 3 comprises a plurality of openings 21, the openings 21a of said plurality of openings being spaced apart from each other along the longitudinal axis X.

[0037] Each opening 21a of the plurality of openings 21 faces a corresponding threaded portion 20a of the plurality of threaded portions 20 in such a way that the openings 21a and the threaded portions 20a alternate along the longitudinal axis X.

[0038] The provision of a plurality of threaded portions spaced apart from each other and not contiguous along the longitudinal axis X and cooperating together to form the receiving seat 30 and a plurality of openings 21, with each opening facing a threaded portion, makes it possible to simplify the production process for the levelling element as explained above, and simultaneously to obtain a stable and solid coupling between the threaded pin and the levelling element.

[0039] It is also possible to considerably reduce the

consumption of material used for realising the body 3.

[0040] In the version shown, the plurality of threaded portions 20 comprises a first plurality 20' and a second plurality 20" of threaded portions on opposite sides with respect to the longitudinal plane XY of the body 3, and similarly the plurality of openings 21 comprises a first plurality 21' and a second plurality 21" of openings on opposite sides with respect to the longitudinal plane XY of the body 3, and each opening 21a faces a corresponding threaded portion 20a and vice versa.

[0041] Each opening 21a of the first plurality of openings 21' faces a corresponding threaded portion 20a of the second plurality of threaded portions 20" and vice versa, each opening 21a of the second plurality of openings 21" facing a corresponding threaded portion 20a of the first plurality of threaded portions 20', in such a way that with respect to said longitudinal plane XY the openings 21a and the threaded portions 20a are arranged longitudinally in an alternating way.

[0042] The body 3 also comprises a pair of uprights 24 extending along the longitudinal axis X, arranged in diametrically opposite positions, to which are connected the threaded portions, inserted between the first and the second plurality of threaded portions.

[0043] The two uprights 24 are provided with guide means 25 intended to act together with corresponding counter-means formed on the outer shell 4 to guide the translational movement of the levelling element 1 with respect to the outer shell 4.

[0044] In the version shown, the guide means comprise a ridge 25a formed on the outer wall of each of the uprights 24, i.e. on the wall intended to be mated in use with the outer shell 4.

[0045] The outer shell 4, shown in greater detail in Figure 7, is intended to be interposed in use between the structure of the item of furniture to be levelled, not shown in the drawings, and the body 3 of the levelling element 1.

[0046] The outer shell 4 comprises a first shell portion 11 and a second shell portion 12 which can be coupled to form a housing seat 40 for housing the body 3 of the levelling element 1 by means of a sliding fit.

[0047] The housing seat 40 has an almost cylindrical form, the longitudinal axis of which essentially coincides with the longitudinal axis X of the body 3, for which reason these axes will be indicated hereinafter by the same reference.

[0048] The body 3 is slidable into the housing seat 40 along the longitudinal axis X in such a way as to vary the overall height of the levelling device 100 of the invention, as explained in greater detail below.

[0049] The first shell portion 11 comprises a partially cylindrical wall 11a intended to be placed, in use, externally to the body 3 of the levelling element 1, and a base portion 11b capable of being supported on the base 2 to improve the stability of the coupling between the levelling element 1 and the outer shell 4.

[0050] The second shell portion 12 has a form complementary to the first shell portion 11 closing the upper

part of the outer shell 4.

[0051] The first and second shell portions 11, 12 are respectively provided with attachment means and counter-means acting together to couple together the first and second shell portions 11, 12 in a stable way.

[0052] In the version shown, the first shell portion 11 is provided with a radial pin 22, while the second shell portion 12 is provided with a hole 23 capable of receiving the radial pin 22.

[0053] The outer shell 4 is also provided with guide counter-means 13 intended to guide the sliding of the levelling element 1 into the housing seat 40 of the outer shell 4.

[0054] In one version, the guide counter-means 13 are intended to act together with corresponding guide means provided on the levelling element 1.

[0055] In the version shown, the guide counter-means 13 comprise a pair of grooves 13a formed on the inner surface of the first shell portion 11 and extending along the longitudinal axis X, preferably provided in diametrically opposite positions and arranged to mate with the ridges 25a provided on the levelling element 1.

[0056] In other versions not shown of the levelling device 100, guide elements other than grooves and ridges may be provided, and/or a different number of grooves and corresponding ridges, and/or grooves extending over only a part of the longitudinal extension of the body 3 and/or formed on the first and/or second shell portion 11, 12.

[0057] The outer shell 4 is also provided with a holding element 15 to translationally fix the threaded pin 5 with respect to the outer shell 4, in such a way that the threaded pin 5 can rotate, with respect to the outer shell 4, about the longitudinal axis X but cannot move translationally along said axis with respect to the outer shell 4.

[0058] In the version shown, a projection 16 is provided which serves as holding element 15 and is positioned on the inner surface of the outer shell 4 and is intended to meet the head 7 of the threaded pin 5 in such a way as to prevent its translational movement along the longitudinal axis X away from the body 3.

[0059] The projection 16 may extend over the entire circumference of the outer shell 4 or only over an arc of circumference of the inner surface of the outer shell 4 with an extension such as to prevent the longitudinal translational movement of the head 7 of the threaded pin 5, preferably over an arc of circumference corresponding to an angle which is less than or equal to 180°.

[0060] On the outer shell 4 is also formed a cavity 26 for rotatably housing the pinion 8, and on the wall of the first shell portion 11 is provided a further hole 18 for accessing the seat 10 formed on the head of the pinion 8.

Claims

1. Levelling device (100) for furniture comprising:

- a levelling element (1) having a supporting base (2) and a body (3) extending perpendicularly from said base in the direction of a longitudinal axis (X) to define the height (L) of the body (3);
 - said body (3) being internally hollow and at least partly threaded to form a receiving seat (30);
 - an outer shell (4) intended to be attached to the structure or an item of furniture;
 - said outer shell (4) forming a housing seat (40) for housing said body (3) with the ability to slide along said longitudinal axis (X);
 - a threaded pin (5) which can be rotatably inserted into said receiving seat (30), said threaded pin (5) being translationally fixed to said outer shell (4) by means of holding elements (15, 16) in such a way that rotation of said threaded pin (5) in said body (3) causes relative translational movement between said body (3) and said outer shell (4), **characterised in that** said body (3) comprises at least one threaded portion (20a) extending over a longitudinal section (L1) of the height (L) of said body (3) which is less than the overall height (L) of the same and is intended to be coupled to an external thread (6a) on the threaded pin (5) and at least one opening (21a) facing said threaded portion (20a) extending over a further longitudinal section (L2) which is not less than the longitudinal section (L1) and is defined by the part of the at least one threaded portion (20a) opposite thereto with respect to a longitudinal plane (XY) passing through said longitudinal axis (X) of said body (3).
2. Levelling device for furniture according to the preceding claim, wherein said at least one threaded portion (20a) extends over an arc of circumference (C1) corresponding to an angle which is less than or equal to 180°.
 3. Levelling device for furniture according to claim 1 or 2, wherein said at least one opening (21a) extends over an arc of circumference (C1) corresponding to an angle which is greater than or equal to 180°.
 4. Levelling device for furniture according to any one of the preceding claims and comprising a plurality of threaded portions (20), the threaded portions (20a) of said plurality of threaded portions (20) being spaced part from each other and not contiguous along the longitudinal axis (X) and cooperating together to form the receiving seat (30) for said threaded pin (5).
 5. Levelling device for furniture according to the preceding claim and comprising a plurality of openings (21), the openings (21a) of said plurality of openings (21) being spaced part from each other and not contiguous along the longitudinal axis (X), each opening (21a) of said plurality of openings (21) facing a corresponding threaded portion (20a) of said plurality of threaded portions (20).
 6. Levelling device for furniture according to the preceding claim, wherein said plurality of threaded portions (20) comprises a first (20') and a second (20'') plurality of threaded portions on opposite sides with respect to the longitudinal plane (XY) and said plurality of openings (21) comprises a first (21') and a second (21'') plurality of openings on opposite sides of the longitudinal plane (XY), and each opening (21a) in said first (21') plurality of openings (21) facing a threaded portion (20a) of said second (20'') plurality of threaded portions (20) and vice versa, in such a way that said openings (21a) and said threaded portions (20a) are arranged longitudinally in an alternating way with respect to the longitudinal plane.
 7. Levelling device for furniture according to any one of the preceding claims, wherein said outer shell (4) comprises a first and a second shell portion (11, 12) which can be coupled to form said housing seat (40) for said body (3), said first and said second shell portion (11, 12) being provided with attachment means and counter means (22, 23) respectively, acting together to couple together said first and second shell portions (11, 12) in a stable way.
 8. Levelling device for furniture according to any one of the preceding claims, wherein said outer shell (4) is provided with guide means (13a) to guide said sliding of said body (3) in said housing seat (40).
 9. Levelling device for furniture according to the preceding claim, wherein said body is provided with guide counter-means (25, 25a) acting together with said guide means (13a) to guide said sliding of said body (3) in said housing seat (40).

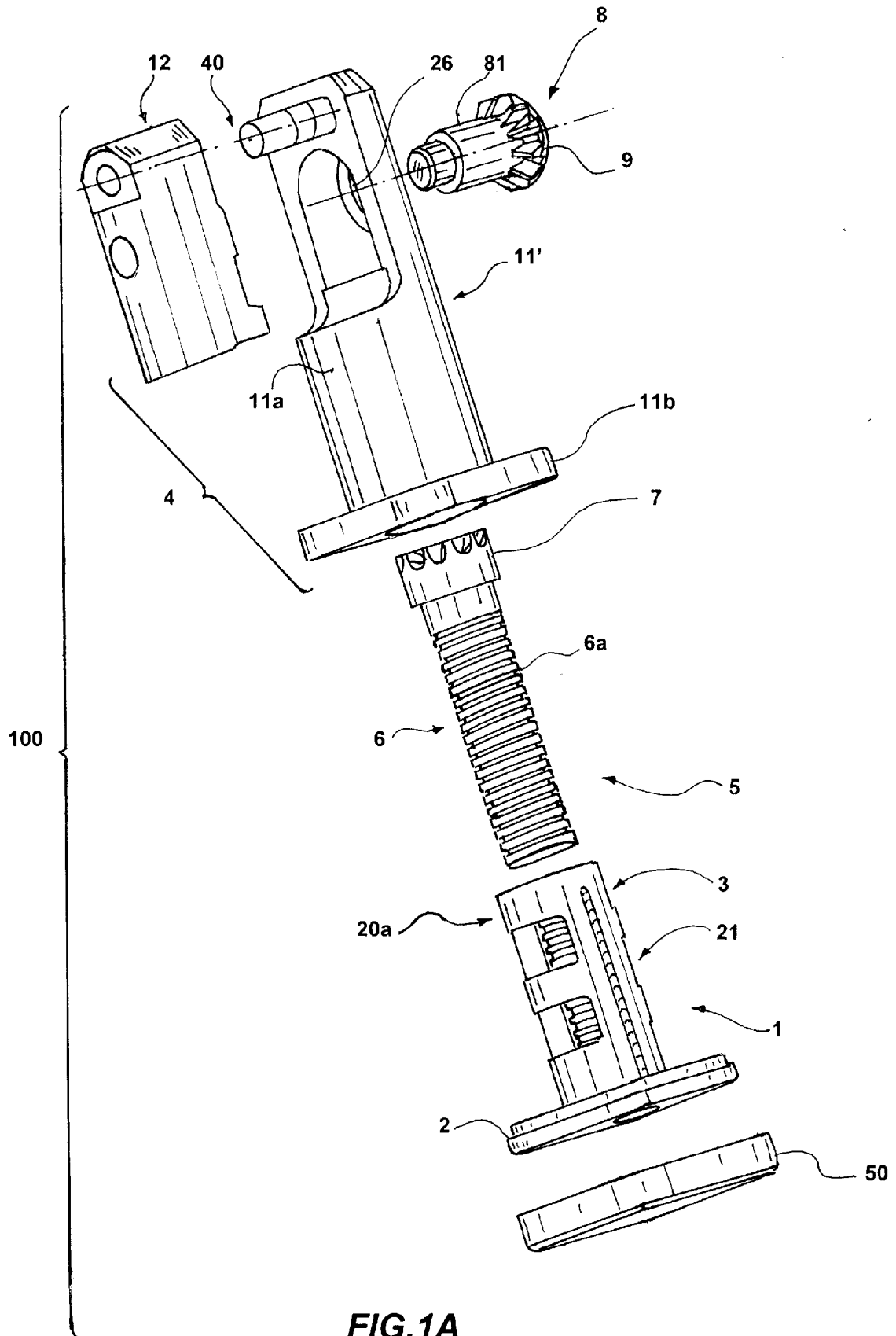


FIG. 1A

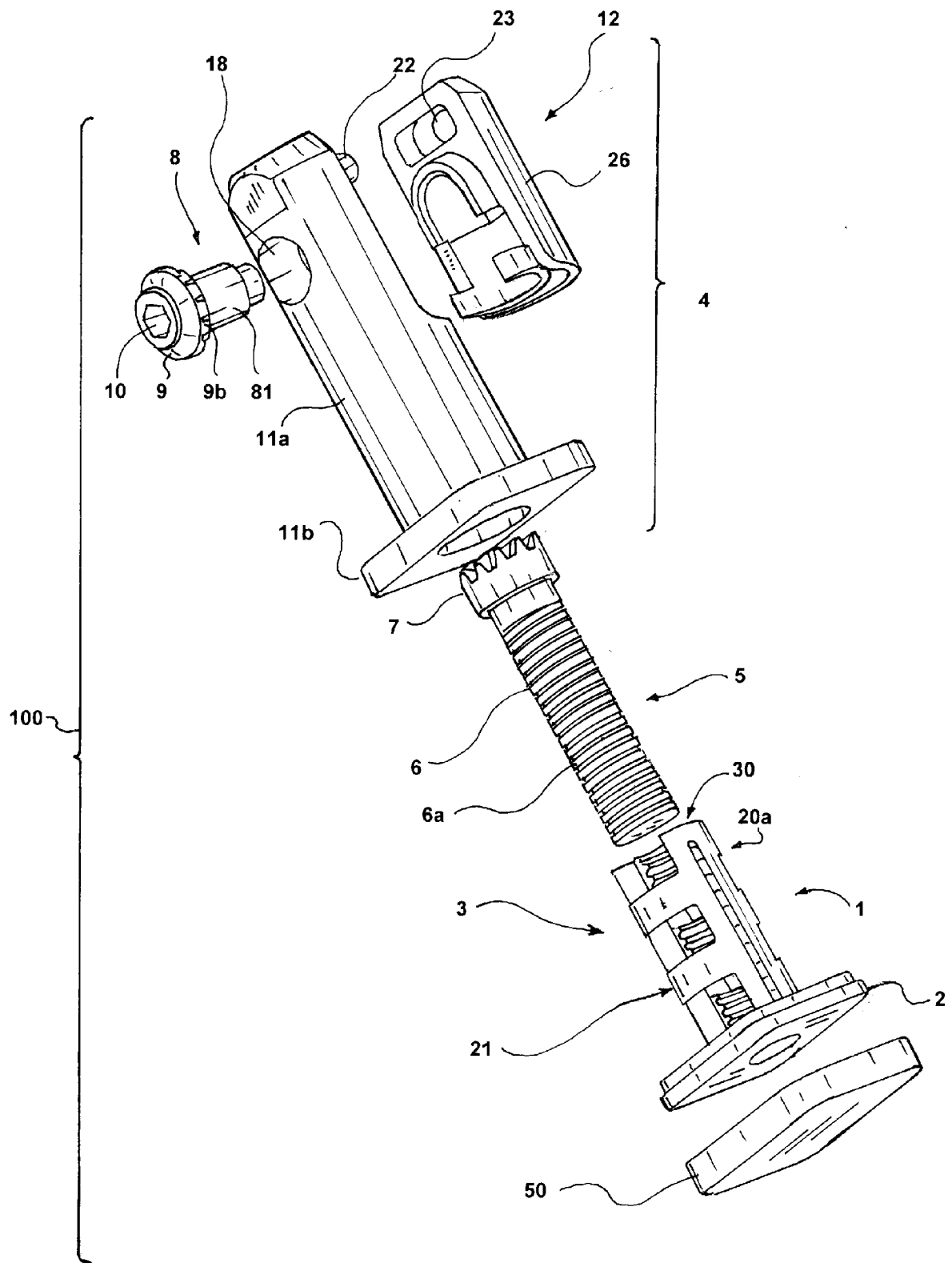
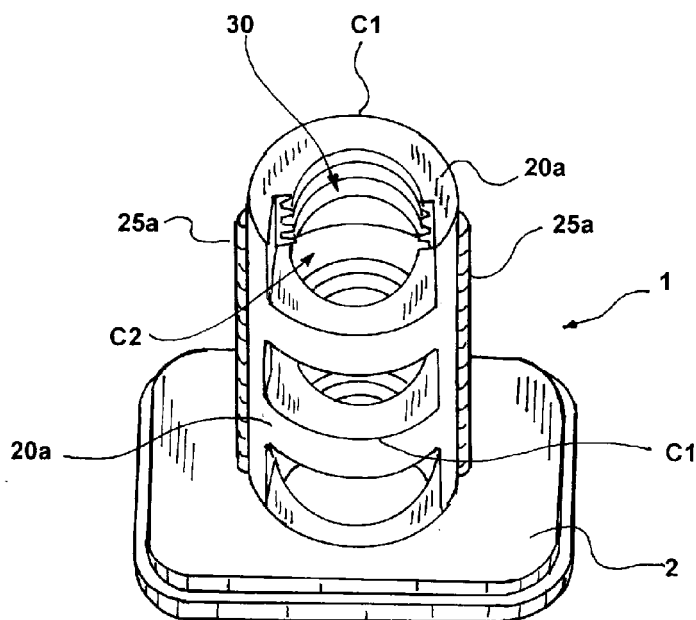
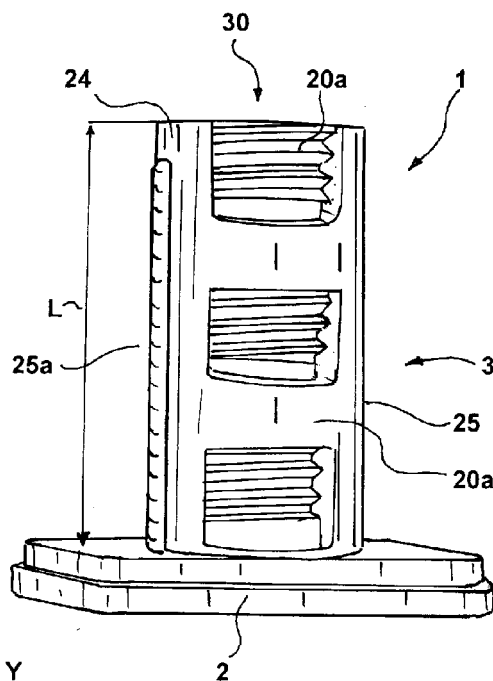
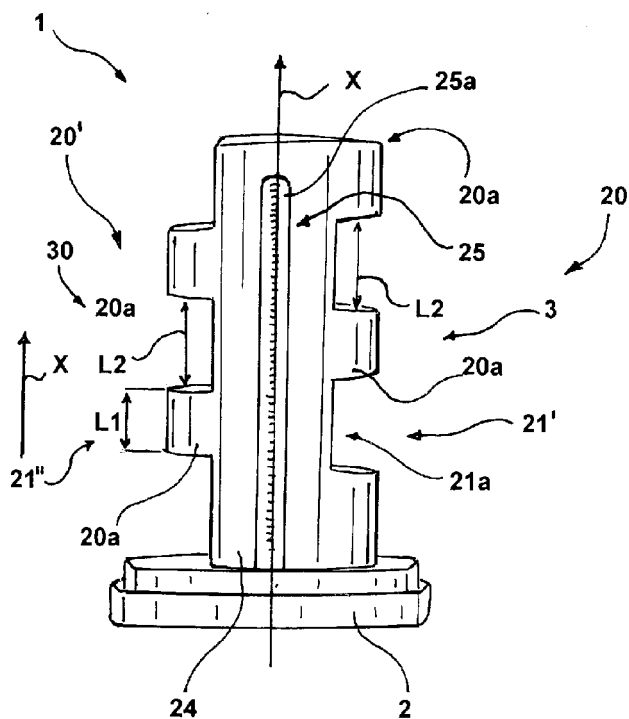


FIG. 1B



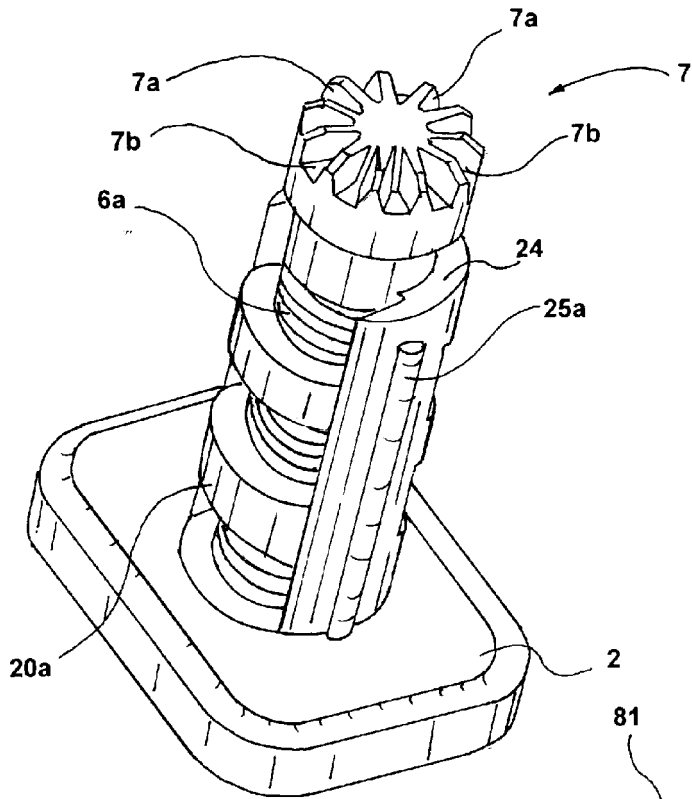


FIG. 5

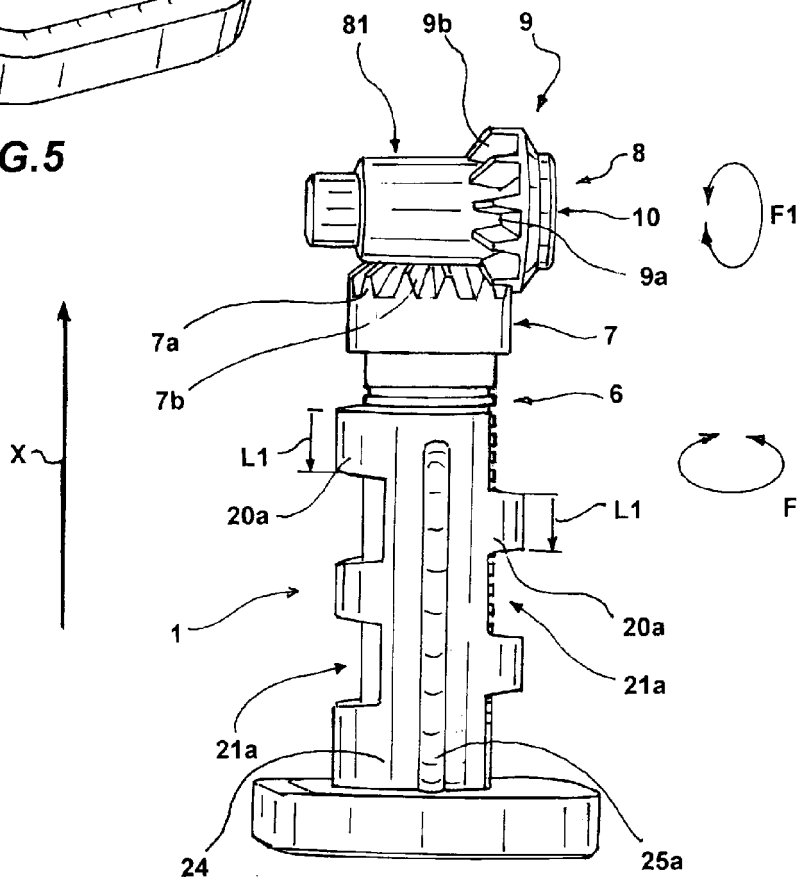


FIG. 6

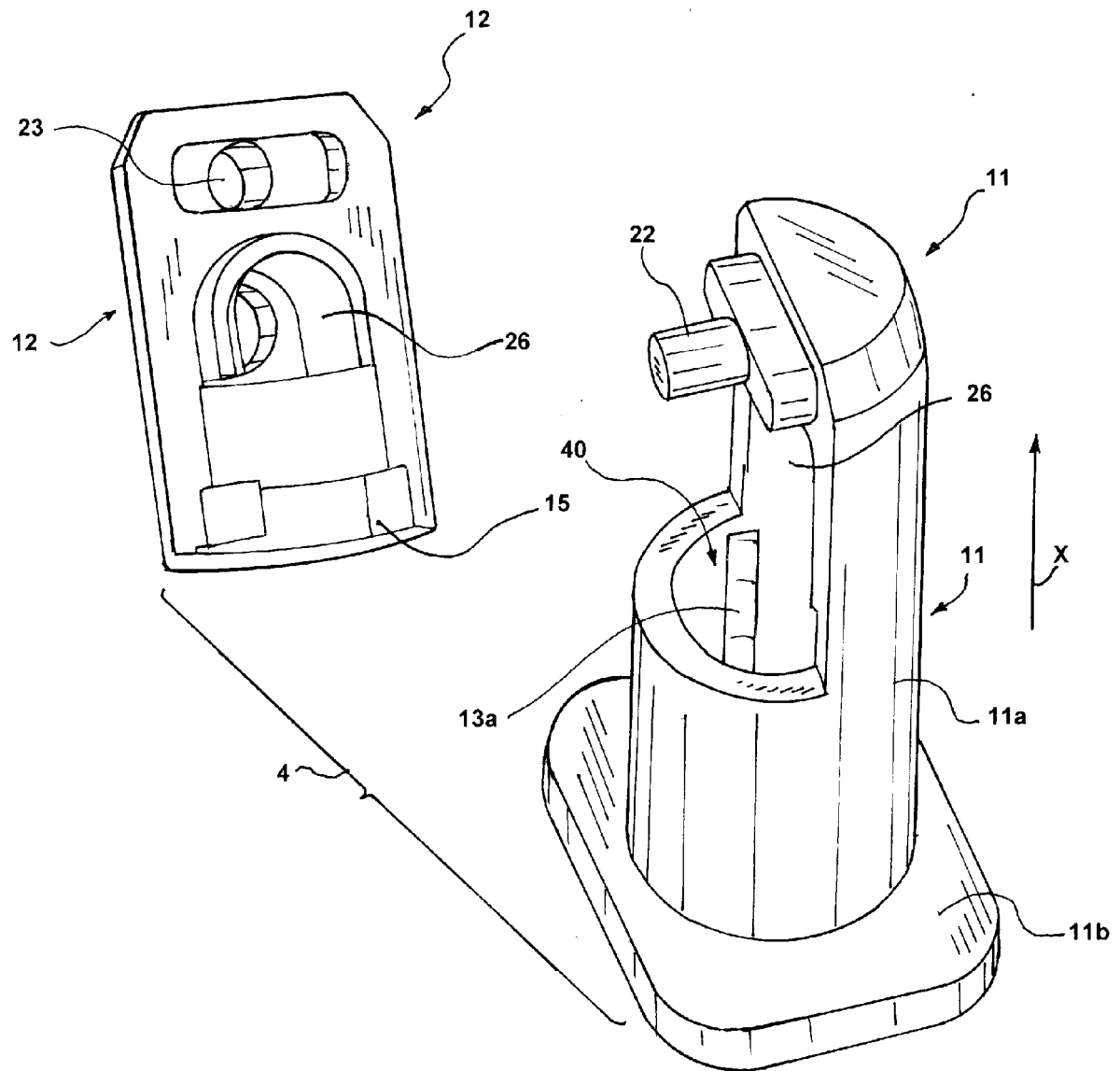


FIG.7



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 4225

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2009/056935 A1 (LEONARDO SRL [IT]; CATTANEO CARLO [IT]) 7 May 2009 (2009-05-07) * the whole document *	1	INV. A47B91/02
A	EP 1 302 132 A2 (SCHWINN GMBH [DE]) 16 April 2003 (2003-04-16) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B F16M D06F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 November 2015	Examiner Jacquemin, Martin
CATEGORY OF CITED DOCUMENTS			
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